Papers

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Community based retrospective study of sex in infant mortality in India

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Abstract

Objective To determine whether the imbalance in the sex ratio in India can be explained by less favourable treatment of girls in infancy.

Design Analysis of results of verbal autopsy reports over a five year period.

Setting Community health project in urban India.

Main outcome measures Deaths from all causes in infants aged less than 1 year.

Results The sex ratio at birth was 869 females per 1000 males. The mean infant mortality was 1.3 times higher in females than in males (72 *v* 55 per 1000). Diarrhoea was responsible for 22% of deaths overall, though twice as many girls died from diarrhoea. There were no significant differences in the numbers of deaths from causes such as birth asphyxia, septicaemia, prematurity, and congenital anomalies. In 10% of deaths there was no preceding illness and no satisfactory cause was found. Three out of every four such deaths were in girls.

Conclusions The excess number of unexplained deaths and deaths due to treatable conditions such as diarrhoeal disease in girls may be because girls are regarded and treated less favourably in India

Introduction

According to the 2001 Indian census there are only 933 females per 1000 males in India.[1] Ordinarily women outnumber men, possibly because the extra X chromosome they carry makes them less susceptible to infectious diseases and protects them against sex linked recessive disorders.[2]

The practice of antenatal selection and termination of female pregnancies in India has persisted,[3] despite the banning of sex determination tests under the Pre Natal Diagnostic Techniques Act (PNDT) 1994.[4] After birth mortality is also higher in female infants, girls, and young women.[5] Various studies have previously shown that compared with boys, female children are often brought to health facilities in more advanced stages of illness, are taken to less qualified doctors when they are ill, and have less money spent on medicines for them.[6] A study in Punjab showed that during the first two years of a child's life, parents spent 2.3 times more on health care for sons than for daughters.[7]

In a community based study we looked at the causes of infant death in girls compared with in boys. If there is discrimination and neglect, there should be an increase in deaths in the neglected sex due to causes that would not be fatal with appropriate care, whereas death rate for diseases with grave prognosis would be equal in both the sexes.

Methods

For the past 20 years the community health department of St Stephen's Hospital has been providing comprehensive health care in three socioeconomically deprived areas of Delhi—Sunder Nagari, Tahirpur, and Amar Colony—with a combined population of about 64 000 people. These areas on the outskirts of the city are relocation settlements started 20 years ago. The average per capita income of a household in these areas is about 600 rupees per month (£8, $13, €11). The average crude birth rate in the area for the five years between 1997 and 2001 was 22.3 live births per 1000 population. The population is 66% Hindu and 34% Muslims, and the crude birth rates in the two communities in 2001 were 17.92 and 22.24 live births per 1000 population respectively.

The midwives in the community health department have been working in the community for the past 7-10 years and their acceptability and rapport with the families is high. They provide health education and collect information on births, deaths, pregnancy, immunisation, and family planning. This information is initially hand recorded and then entered into a computerised management information system. Here we are analysing data for the five year period from January 1997 to December 2001.

Verbal autopsies are used for finding out the cause of each death. Every month the midwives discuss any cases with a visiting paediatrician. Where information seemed inadequate, the house is revisited. The record of deaths maintained by the midwives forms the basis of this study.

We examined the number of live born infants and infant deaths each year by sex and cause of death. All cases of death of children reported as sudden and without any preceding illness were categorised as "unexplained deaths." We categorised cases in which the cause of death could not be ascertained—for example, when the family had moved out of the area—as "data not available." We examined overall infant mortality for each of the five years under study and

compared overall mortality and cause specific mortality by sex.

Results

There were 7012 live births, 3752 boys and 3260 girls. The sex ratio at birth in the area was 869 girls:1000 boys. There were 442 deaths in children under the age of 1 year, 234 girls (53%) and 208 boys (47%). The average mortality for the period was 63 per 1000 live births. The figure shows the infant mortality each year for the two sexes. The mean mortality for girls was 1.3 times that of the boys (72 v 55 per 1000).

There was significant difference in mortality between girls and boys for diarrhoea and unexplained deaths (table, P < 0.05). There was no significant difference in deaths due to less preventable and less treatable conditions like birth asphyxia, immaturity, septicaemia, and congenital anomalies. Half of the unexplained deaths (22/44) occurred in the first month of life, and 19 of these 22 deaths were among females.

For diarrhoeal diseases the cause specific mortality in female infants was twice that in male infants. For congenital anomalies and birth asphyxia it was higher in male than in female infants, though not significantly so.

We also looked at the cause specific mortality in Hindu and Muslim communities. The average monthly per capita income was 679 rupees in Hindus and 423 rupees in Muslims. There was no significant difference in the cause specific mortality in the two communities for preventable and treatable causes or less preventable causes.

Overall the mean per capita income of families in which infants had died from diarrhoea was the lowest at 409 rupees, and in families in which the deaths were unexplained was the highest at 537 rupees.

Discussion

Infant mortality in girls

Mortality in female infants was 1.3 times higher than in male infants, and most sudden unexplained deaths with no preceding history of illness were in girls. Discrimination, which may lead to increased mortality among female children, has been the subject of many previous studies. The World Health Organization has reported that the sex disparities in health and education are higher in South Asia, including India, than anywhere else in the world.[8]

The principal causes of infant mortality in India are low birth weight, birth injury, diarrhoeal diseases, and acute respiratory infection.[9] The numbers of male and female infants dying of birth asphyxia, septicaemia, immaturity, and congenital anomalies were matched and not significantly different. However for the preventable and treatable illness of diarrhoea, there were twice as many deaths among girls compared with boys.

Verbal autopsy is a standard, well documented, and validated method of finding cause of death in a developing country like India.[10–12] Due to paucity of resources, the cause of every death occurring outside a hospital or medical centre cannot be certified after a postmortem examination. In our study, the information collected by the auxiliary nurse midwives was scrutinised during monthly meetings with the paediatrician before the cause of death was agreed. Most data were collected within one month of the date of death, and was not too long to influence recall.

Unexplained deaths

In our group of unexplained deaths, parents were not able to give a satisfactory explanation for death or give a history of any illness. Most deaths in this group were in female infants and most occurred soon after birth.
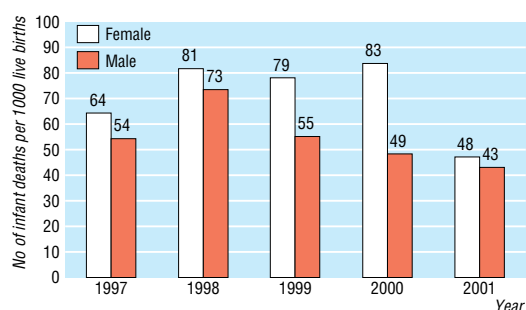
Infant mortality by year in study area

Cause of death in 442 infants who died aged ≤1 year

Cause	No of deaths			Cause specific mortality		Odds ratio(95% C)	χ^2	P value
	Total	Male	Female	Male	Female			
Unexplained deaths	44	11	33	2.93	10.12	3.48 (1.69 to 7.31)	13.34	<0.05
Diarrhoea	95	32	63	8.53	19.32	2.29 (1.46 to 3.59)	14.42	<0.05
Acute respiratory infection	48	22	26	5.86	7.97	1.36 (0.75 to 2.50)	0.85	0.36
High fever	5	4	1	1.06	0.3	0.29 (0.01 to 2.70)	0.55	0.46
Malnutrition	14	7	7	1.86	2.14	1.15 (0.36 to 3.64)	0	1
Jaundice	4	3	1	0.79	0.3	0.38 (0.02 to 4.29)	0.13	0.72
Birth asphyxia	62	34	28	9.06	8.59	0.95 (0.56 to 1.61)	0.01	0.93
Immaturity	55	28	27	7.46	8.28	1.11 (0.63 to 1.95)	0.06	0.8
Septicaemia	39	20	19	5.33	5.82	1.09 (0.56 to 2.14)	0.01	0.91
Congenital anomaly	37	24	13	6.39	3.98	0.62 (0.30 to 1.28)	1.5	0.22
Convulsions	9	5	4	1.33	1.22	0.92 (0.21 to 3.93)	0.04	0.83
Injury	5	1	4	0.27	1.23	4.61 (0.49 to 108.27)	1.11	0.29
Others*	14	9	5	2.39	1.53	0.64 (0.19 to 2.08)	0.29	0.59
Data not available	11	8	3	2.13	0.92	0.43 (0.09 to 1.78)	0.95	0.33

*Meningitis with septicaemia (2), strangulated hernia (1), aspiration of feed (1), exanthematous fever (1), birth trauma (1), bleeding from cord with exsanguination (2), postoperative complication of shunt surgery for hydrocephalus (1), Rh incompatibility (1), sepsis (1), possible reaction to injection given to control vomiting (1).

What is already known on this topic

There are more men than women in India

Sex discrimination and bias in favour of male children results in selective termination of female pregnancies

Mortality is high in female infants, girls, and young women

What this study adds

There is an excess of female deaths due to easily treatable conditions

There are a large number of unexplained female deaths, which may be considered as deaths under suspicious circumstances

Could such deaths be an extension into the early neonatal period of female feticide?

The mean per capita income of families in which infants died of unexplained causes was higher than families in which infants dies from diarrhoeal diseases. Therefore it seems that any sex discrimination cannot be explained by extreme poverty. Booth et al found that fetal sex determination was more common among families with higher incomes.[13] The state of Punjab, which has one of the highest per capita income in India (19 001-22 000 rupees per year) has one of the lowest sex ratios in the country (874 females:1000 males), while poor states like Bihar and Orissa (4001-7000 rupees per capita income) have sex ratios of 921 and 972 females per 1000 males, respectively.[1]

As this was a retrospective study we could not look at the circumstances surrounding these unexplained deaths. Further community based prospective studies are needed to examine these issues. Though the 1994 act attempted to alter the adverse sex ratio by banning sex determination tests, this cannot change the attitudes of people towards female infants. Improved access to health care and education of health professionals to pay attention to girls would be beneficial.

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Effect of non-steroidal anti-inflammatory drugs on risk of Alzheimer's disease: systematic review and meta-analysis of observational studies

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Abstract

Objectives To quantify the risk of Alzheimer's disease in users of all non-steroidal anti-inflammatory drugs (NSAIDs) and users of aspirin and to determine any influence of duration of use.
Design Systematic review and meta-analysis of observational studies published between 1966 and October 2002 that examined the role of NSAID use in preventing Alzheimer's disease. Studies identified through Medline, Embase, International Pharmaceutical Abstracts, and the Cochrane Library.
Results Nine studies looked at all NSAIDs in adults aged > 55 years. Six were cohort studies (total of 13 211 participants), and three were case-control studies (1443 participants). The pooled relative risk of Alzheimer's disease among users of NSAIDs was 0.72 (95% confidence interval 0.56 to 0.94). The risk was 0.95 (0.70 to 1.29) among short term users (<1 month) and 0.83 (0.65 to 1.06) and 0.27 (0.13 to 0.58) among intermediate term (mostly <24 months) and long term (mostly >24 months) users, respectively. The pooled relative risk in the eight studies of aspirin users was 0.87 (0.70 to 1.07).
Conclusions NSAIDs offer some protection against the development of Alzheimer's disease. The appropriate dosage and duration of drug use and the ratios of risk to benefit are still unclear.

Introduction

Pharmacological treatments of Alzheimer's disease are limited. Recent observational studies, however, have shown that use of non-steroidal anti-inflammatory drugs (NSAIDs) may protect against the development of the disease,[1 2] possibly through their anti-